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APL

## WHAT IS APL?

APL is an all-purpose language offered in two versions that may be used for interactive or for batch processing. The low-cost APL Basic system suits users who do not require file I/O or advanced APL functions. APL with Systems Functions (APLSF, hereafter referred to simply as APL) has all the features of APL Basic plus advanced features which substantially increase the range of applications for which it can be used.

A user-defined APL function may request its data input from a standard ASCII sequential file, which has been previously created by the output from a FORTRAN or COBOL program or another APL program.

An APL program can store its computation results (intermediate results from a tape-merging process) on an internal sequential file for use by another APL function. Since no format conversion is necessary, there is practically no overhead in constructing I/O internal sequential files.

A reservation system may be implemented as a set of APL programs that operate on a common data base constructed as an internal format random-access file. (APL also has provisions to allow several users to concurrently share the same data file.)

An added capability of the file system is its ability to handle immediate mode I/O through devices other than the user's terminal. Output that would normally be printed at the terminal can be diverted to the line printer by executing the system command )OUTPUT LPT: or diverted to an ASCII disk file by )OUTPUT AFILE.DAT.

## KEY FEATURES OF APL

- Error Trapping permits computer-assisted instruction applications.
- APL allows the writer to test for numeric input, where expected, without getting an error by using the  $\square$ FI and  $\square$ VI system functions.
- System functions permit the user to obtain canonical string representations, create local functions, erase and classify names from workspaces and perform various file I/O operations, including ENQ/DEQ.
- System variables allow the user to set tolerances, index origins, and maximum and minimum values; compute random numbers; and store accounting information.
- APL can access arbitrary disk files, including those read and written by other languages.

The file system provides easy access to any one of these file formats: ASCII sequential; internal sequential, a special APL file format which preserves the shape and values of APL data; direct access files; and binary access files.

- Divide-quad provides a single function to solve a set of linear equations, to take the inverse of a matrix or to solve an overdetermined set of linear equations using a "least-squares" fit.



## EXECUTE AND QUOTE OPERATORS

The Execute Operator allows any APL character string to be evaluated as if it were typed from a terminal in immediate mode.

There is no restriction on the contents of the character string to be evaluated. A string may contain system commands, function definitions or several statement lines delineated by carriage returns.

The Quote Operator provides an inverse to the Execute Operator. This function gives the user the capability to convert a function definition to a corresponding character string, the lines of the function being separated by carriage returns. The resulting string can then be modified and executed with the Execute function, all under program control with no user intervention.

The Quote Operator also provides the ability to convert numeric data to a character string. Additionally, it gives the user the capability to write user-defined functions for special output formatting and function editing.

## ERROR ANALYSIS AND RECOVERY

APL allows the user to take remedial action in case of error rather than simply stopping and suspending the function. It is particularly important with the Execute Operator, since arbitrary character strings are being evaluated. Error trapping also permits computer-assisted instruction applications.

- DYADIC-FORMAT Function provides a convenient mechanism for formatting output data and demands less CPU time than previous format operators.
- Operations involving the use of the APL file system are invoked by using two operators:  $\boxed{\leftarrow}$  for input and  $\boxed{\rightarrow}$  for output, with suitable subscripts and arguments.

## TYPICAL USERS OF APL

### Scientists

Scientists find APL to be a rich and useful language, a substantially more powerful replacement for other science-oriented programming languages.

Key scientific applications include computer graphics, simulation and modeling, numerical analysis and advanced research computations.

### Educators

Classroom applications for APL include drafting, graphics, calculus, physics, engineering, statistics, linear programming and probability theory.

### Businessmen

APL has been used for financial modeling, cost-time revenue studies and general ledger accounting. One user uses APL interactively to manage budgets, monitor activities of various accounts and track expenses vs. available dollars.

## DOCUMENTATION

Documentation provided with APL is the APLSF Programmer's Reference Manual.

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